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German Democratic Republic

EXPERIMENTS ON EFFECT OF HNO_3 ON NICKEL WIRE CLOTH

experiments conducted to determine the effect of 20-percent HNO_3 on very fine nickel wire cloth. the purpose of the experiments was to determine whether treatment with HNO_3 could be used as a ^{quick} method of determining the quality of nickel cloth samples.

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Seven separate experiments were conducted, in which the wire cloth was given different kinds of treatment before being immersed in the acid (e.g., heating in hydrogen, heating in air, washing with ammonia, coating with oil) and was immersed in different ways (vertically, horizontally, partially). In all cases, certain of the warp wires were attacked by the acid more pronouncedly than the remaining warp wires and the shuttle wires. The reason for this is that the warp wires are finer than the shuttle wires and some of the warp wires are finer than others, even though the variation is within prescribed tolerances. It is these finest wires which dissolve more readily in the acid, not only because of their smaller diameter, per se, but also because a finer wire becomes more sharply crimped and consequently is more susceptible to the action of the acid.

Other conclusions drawn from the experiments:

A fast slight oxidation takes place on the surface of the wires which retards the action of the acid. This oxidation layer, or other surface coatings such as soot or oil, is removed by heating in hydrogen, so that the acid acts on the metal more rapidly than in the case of untreated wire cloth.

The action of the acid on the wire is affected by autocatalysis; i.e., the formation of NO , NO_2 , and $\text{Ni}(\text{NO}_3)_2$ during the reaction speeds up the process of solution. The age and condition of the acid used might thus affect the results; acid which had been kept for some time exposed to sunlight would probably contain appreciable amounts of the oxides even before the reaction started, whereas fresh acid would normally contain almost no oxides.

Because of the variable factors of wire thickness, surface protection by oxidation layer or other coating, and the results of autocatalysis, wrong conclusions might easily be drawn from the effect of the acid on the wire, and the process is therefore not practical for testing nickel wire cloth.

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